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国台学术报告 NAOC COLLOQUIUM

2011 年 第 57 次 / Number 57, 2011

TIME: Wednesday 3:00 PM, Oct. 26, 2011 **LOCATION: A601 NAOC**

Ubiquitous high-speed solar coronal outflows revealed by both imaging and spectroscopic observationsa

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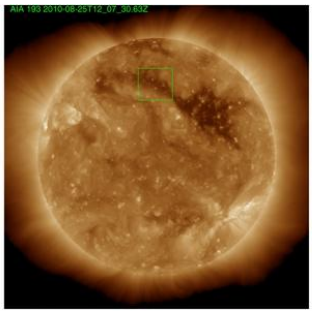
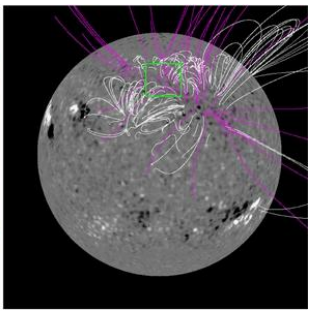
Hui Tian started his PhD study in September 2005 at Peking University, under the supervision of Prof. Chuanyi Tu. He was a visiting student at Max-Planck-Institute for solar system research from September 2007 to September 2009. He received his doctoral degree in space physics from Peking University in 2010 and began to work as an ASP postdoc fellow in High Altitude Observatory, National Center for Atmospheric Research of the US since August 2010. Hui Tian is specialized in analyzing and interpreting data obtained by solar EUV spectroscopic observations. His research interests include spectroscopic investigations of coronal heating, solar wind origin, transition region structures and CME dynamics.

Abstract





X-ray and EUV imaging observations often reveal quasi-periodic propagating disturbances along the fan-like structures at edges of active regions. These disturbances have historically been interpreted as being the signature of slow-mode magnetoacoustic waves propagating into the corona. Recent spectroscopic observations have revealed the ubiquitous presence of blueward asymmetries of EUV emission line profiles. Such asymmetries suggest that there are at least two emission components: a primary component accounting for the background emission and a secondary component associated with high-speed upflows. Through jointed imaging and spectroscopic observations, we demonstrate that the propagating disturbances are responsible for the secondary component of line profiles and that they are real plasma outflows rather than slow waves. With the high-S/N SDO/AIA observations, we further find that high-speed episodic outflows (jets) are not restricted to active region edges and polar plumes, but are also present in plume-like structures originating from equatorial coronal holes and quiet-Sun regions. Furthermore, the fine structures traced out by these flows continually exhibit transverse motions indicative of ubiquitous Alfven waves. We propose that these ubiquitous outflows, which may result from impulsive heating processes in the chromosphere, could be an efficient means to provide heated mass into the corona to maintain the million-degree temperature and also serve as an important source of mass supply to the solar wind. The high-speed outflows are also clearly present in CME-induced dimming regions. We demonstrate that EUV spectroscopic observations can reveal valuable information of the kinematics and plasma properties of CMEs.

All are welcome! Tea, coffee, biscuits will be served at 2:45

You are welcome to nominate speakers to Shude Mao (shude.mao@gmail.com), Licai Deng (licai@bao.ac.cn), Xuelei Chen (xuelei@cosmology.bao.ac.cn).